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Progress Report, Period Ending
September 30, 1972
Proposal No. SR 354,
P. I. No. UN-279
Applicability of ERTS-A to
Montana Geology

Department of Geology
University of Montana
Missoula, MT 59801
October 9, 1972

Mr. R. D. Phillips, Contracting Officer
Code 245, GSFC
Greenbelt, MD 20771

Dear Mr. Phillips:

To carry out the objectives of our proposal (namely to test the application of ERTS-1 imagery to geologic and tectonic mapping in Montana) contract NAS5-21826 was executed August 11, 1972. In order to expedite the investigation, the University had previously authorized the placing of equipment orders and full-time work by Dr. Hyndman and myself beginning July 5th.

During the reporting period, full-time NASA-funded work on the project was carried out as follows:

Faculty		Graduate Research Assistants	
Robert M. Weidman	10 weeks	Raymond E. Flood, Jr.	4 weeks
Donald W. Hyndman	8 weeks	Katharine T. Hawley	4 weeks
		Linda K. Wackwitz	4 weeks

Contributed work on the project was carried out as follows:

Faculty		NSF Undergraduate Research Participation Program	
David D. Alt	10 weeks, half time	Douglas Harby	6 weeks
		Joseph Meglen	10 weeks
James L. Talbot	1/2 week		

Work performed during the reporting period included:

1. Ordering new government furnished equipment and departmental equipment. (see Attachment A)

2. Literature search for published and unpublished geologic maps covering test sites 354 A & C, B, D, and F and adjoining areas.

3. Compilation of geologic ground truth maps for the above test sites on reverse-reading Cronaflex 1/250,000 Scale Series topographic base sheets. Maps were colored to delineate major rock types. (see Attachment B)

4. Installation of equipment in Science Complex Room 4 and setting up of research assistants' office in Science Complex Room 305.

5. Modification of Instructional Materials Services projector to take 70mm diapositives in roll form.

6. Orientation of personnel through seminars and 3 1/2 days of field trips.

7. Preliminary investigation of test site U-2 photographs. (see Attachment C) The following work covered Sites A & C, B, and D only:

   a. Initial examination of diapositives and determination of scale for selected frames; determination of average scale (1/439,000).

   b. Preparation of mosaic base maps for test sites from 1/126,000 scale Forest Service maps; delivery for photo-reduction to 1/439,000 scale.

   c. Delivery of negatives for LogEtronics contact printing for mosaic laying.

Work is reasonably on schedule under the revised personnel loading graph submitted during contract negotiations. We are behind schedule in preliminary data analysis because of delay in receipt of U-2 photographs and non-receipt of ERTS imagery, but we are ahead of schedule with ground truth compilation, which we had intended to stretch out and blend with image analysis. Alt was not able to work full-time during the summer because execution of the contract came too late for the department to find a replacement to handle his summer session teaching duties.

We are beginning Phase II October 1, using U-2 photographs on hand and ERTS imagery expected from a shipment made October 1st. This effort will involve the laying of U-2 photomosaics for the

western test sites and a Montana mosaic using ERTS images, lineament annotation and analysis, sample photogeologic discrimination and methodology studies, and preliminary color enhancement experiments. The work will proceed more slowly than it would have during the summer because it will be done on a part-time basis by Missoula personnel and because Johns will not begin work in Butte until after experience in Missoula reveals the most effective study techniques.

As yet there is little in the way of technical or scientific progress to report. We feel that our ground truth map compilations have the necessary reliability to test our imagery interpretations for both ERTS and U-2 coverage because they were compiled mainly from larger scale geologic maps and because the compiled test site geologic maps (1/250,000 scale) are at a scale which is larger than that of both types of imagery. One technical observation which may be of use to other investigators concerns the sharpness of 3rd generation U-2 Vinten camera negatives. After consultation with Ames Research Center, we requested 3rd generation negatives in order to get sharper contact prints than those expected from 2nd generation negatives. Although we have yet to receive contact prints from the processor, we have made enlargements to compare with those made from 2nd generation negatives for the 22 October 1971 Wyoming coverage; we find that the Wyoming negatives will stand enlargement to 18" square, whereas our negatives will stand enlargement only to 12" square.

Problems to date have been mainly uncertainties of scheduling related to delays in obtaining photographs and imagery. We have been able to work around them successfully except in the case of one of the undergraduate research participants. However, reasonably complete ERTS imagery coverage for Montana is needed soon to allow completion of Phase II on schedule.

Sincerely yours,

Robert M. Weidman

Robert M. Weidman
Principal Investigator

RMW/wk

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Attachment A. New Equipment Status

Attachment B. Ground Truth Color Legend

Attachment C. Imagery Received

Attachment D. Test Site Index Map

Attachment A.--New Equipment Status

NEW GOVERNMENT FURNISHED EQUIPMENT

1	Portable light table (Richards Model GFL-918LW)	delivered
1	Light table with zoom stereoscope carriage (Richards MIM-13100)	shipped
1	Zoom stereoscope (B & L Model 240/6)	promised Oct., 72'
1	Binocular microscope with plotting attachment (Wild M-7)	delivered (drawing attachment back-ordered)
3	Portable bridge-type lens stereoscopes (Abrams Model CB-1)	delivered
1	Additive color viewer (Spectral Data Model 64)	delivered

NEW DEPARTMENTAL EQUIPMENT

1	B & L Zoom transfer scope (ZT4 wide base)	expected Nov., '72
2	Filing cabinets	delivered
3	Work tables	delivered
1	10-drawer map file	ordered Sept., 14

Attachment B.--Ground Truth Color Legend Units

sandy rocks (including quartzite)
shaly rocks (including argillite)
lime rocks (including marble, dolomite, etc.)
granitic rocks (including granodiorite)
diorite, gabbro, basalt
alluvium, glacial deposits, etc.
Tertiary sediments
gneiss
pelitic schist
calc-silicate or amphibolite

Attachment C.--Imagery Received

U-2 Photography:

Flight 72-125 (7/26/72, covering Sites 354 A & C, B, D)

B & W Vinten duplicates received 9/11 and 9/25/72.
Green and red bands good; IR band rather fogged;
70mm color IR spoiled.
Metric camera color IR shipment pending.
Documentation pending.

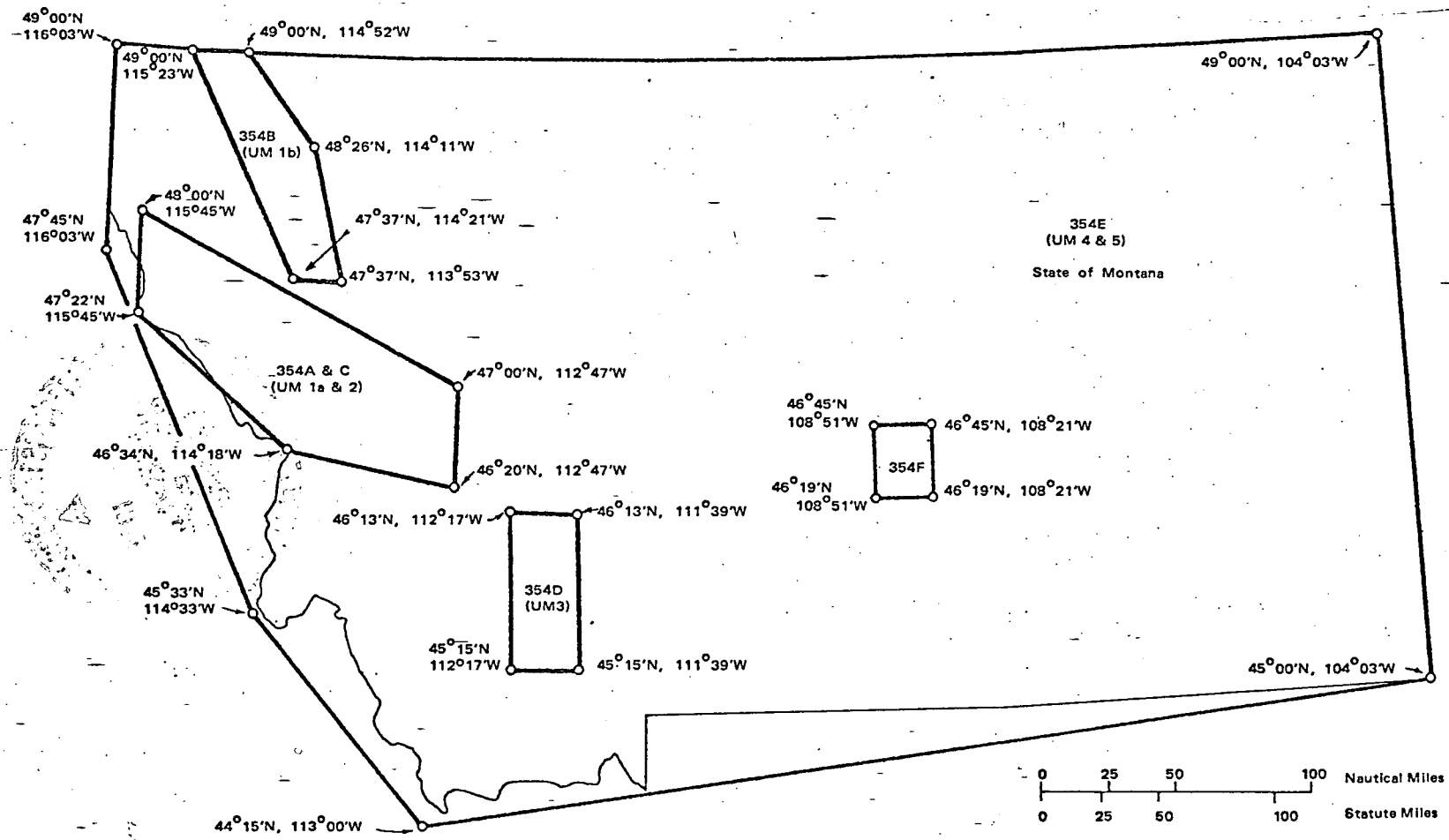
Flight 72-138 (8/11/72, covering Site 354F)

B & W and color IR Vinten duplicates received 9/25/72.
All good quality.
Metric camera color IR shipment pending.
Documentation pending.

ERTS Imagery:

First shipment in mail 10/1/72.

Attachment D.--Test Site Index Map



University of Montana ERTS-A Test Sites. Identification is by NASA site numbers (354A) and University of Montana proposal numbers (UM 1a).